

RESEARCH OF ENERGY CONSUMPTION CONTROL OF RENEWABLE ENERGY SOURCE BY CONSUMERS

¹Siddiqov Ilhom Xakimovich, ²Denmuxammadiyev Aktam mavlonovich, ³A'zamov Saidikrom Saidmurodovich

¹Tashkent University of Information Technologies named after Muhammad al-Khwarizmi

²Tashkent Institute of Irrigation and Agricultural Mechanization Engineers" (National Research University)

³ "Andijan Machine-Building Institute", doctoral student

<https://doi.org/10.5281/zenodo.7783839>

Abstract. Today's need for energy in our country and the world is increasing in the auto world, in the world, in our country, in the whole economy, traditional fossil fuels are used to import renewable fossil energy, compatible with the climate of our ecologically clean country, and rationally and safely use the energy produced.

Keywords: solar power supply source, wind energy supply, efficiency improvement, asynchronous motor, battery, energy supply, model, technological process.

Introduction

Introduction when supplying industrial and household consumers with electricity from a supply system based on the combined use of solar and wind energy, the consumer, renewable energy sources of energy equipment and elements of the supply system can be connected by various schemes. . Consumers of energy supply based on the use of renewable energy (QTE) can be used as single-phase and three-phase depending on the condition of energy supply and may be connected to different connection and supply systems. an asynchronous motor that converts into mechanical energy is considered. This type of motors can be connected to a single and three-phase network.

We can look at the distribution graph of the total produced electricity consumers.

1.	The name of the formula	Writing the formula	unit
2.	Alternative energy expression of the reactive power consumed by the source induction motor	$Q_A = 3I_1^2 X_1 + 3I_0^2 X_0 + 3(I_2')^2 X_2'$	VAr
4.	Alternative energy source asynchronous motor load factor	$\beta = R/R_{nominal}$	%
5.	Alternative energy Based on the passport data, the nominal power of the source asynchronous motor is determined as follows.	$Q_{nom} = \frac{P_{nom}}{\eta_{nom}} = tg\varphi_{nom}$	VAr
6.	Alternative energy source asynchronous motor reactive power dissipation is found as follows	$Q_0 = \sqrt{3}I_0 U_{nom}$ $= \cos\varphi_{nom} \frac{I_0}{I_{nom} \cos\varphi_{nom}} = \frac{P_{nom}}{\eta_{nom}}$ $= I_0/I_{nom} \cos\varphi_{nom}$	

7.	Determination of three-phase reactive power	$Q_0 \approx \sqrt{3} I_0 U_{nom}$	VAr
----	---	------------------------------------	-----

In table 1 below, we can see the formula and unit for finding the power of the asynchronous motor, which is the main energy consumer, it is known that the main consumer of the generated electricity is the asynchronous motors, and at the same time, the losses in the motors are more than other types of consumers. A number of scientists are conducting research to overcome these problems, including our proposed method. In combined energy supply, energy sources can work separately or together.

Recommended method if solar energy equipment (EQ) and wind energy equipment (WE) are used together according to a separate connection scheme, each energy equipment has its own collects excess heat energy in a personal tank-accumulator. With such a scheme, excessive energy waste in the operation of solar and wind energy devices will increase sharply, and the efficiency of the use of solar and wind energy devices will decrease. As a result, the funds spent on creating a combined energy device may not pay for itself. Heat energy produced during parallel operation of SE and WE is collected in a common tank-accumulator. In such a situation, the influence of energy sources on each other's work can be observed. The simultaneous introduction of solar and wind energy also allows the AE battery to accumulate enough energy for a short time.

In this case, there is also a situation where solar and wind energies are not fully used and the efficiency of combined solar and wind power plants is reduced.

From the above, it can be concluded that the efficiency of using wind and solar energy depends on the mode of accumulation of the produced energy. To store excess thermal energy, the capacity (size) of the battery must be determined and based on this. Basing it on a daily consumption may reduce the efficiency of using solar and wind energy. The analysis of the circuits showed that the case where the energy sources are connected according to the parallel operation scheme is more efficient, and the cost of energy equipment is higher than when they work according to the separate operation scheme.

In the heat supply scheme based on SE sources, the thermal energy accumulator plays an important role and is considered a coordinating element between the energy source and the consumer.

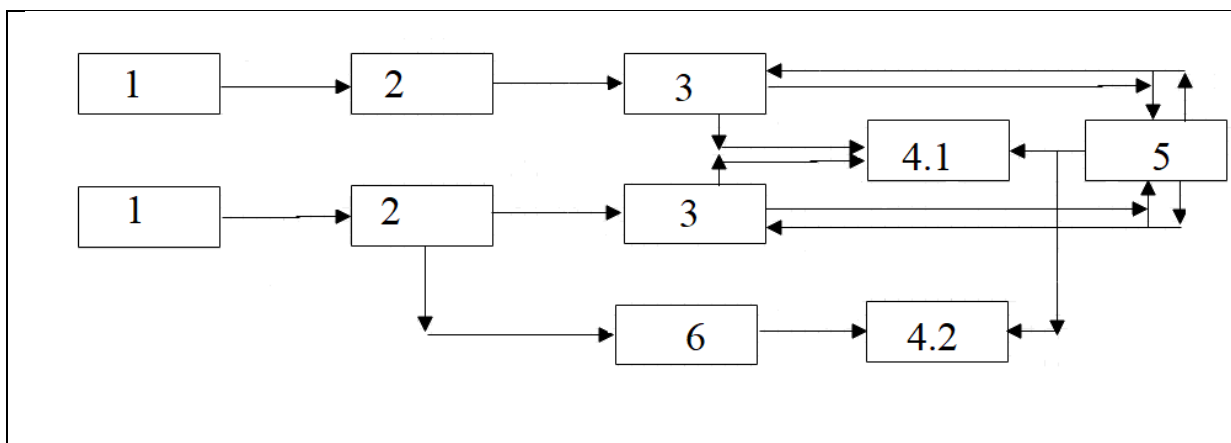


Figure 1

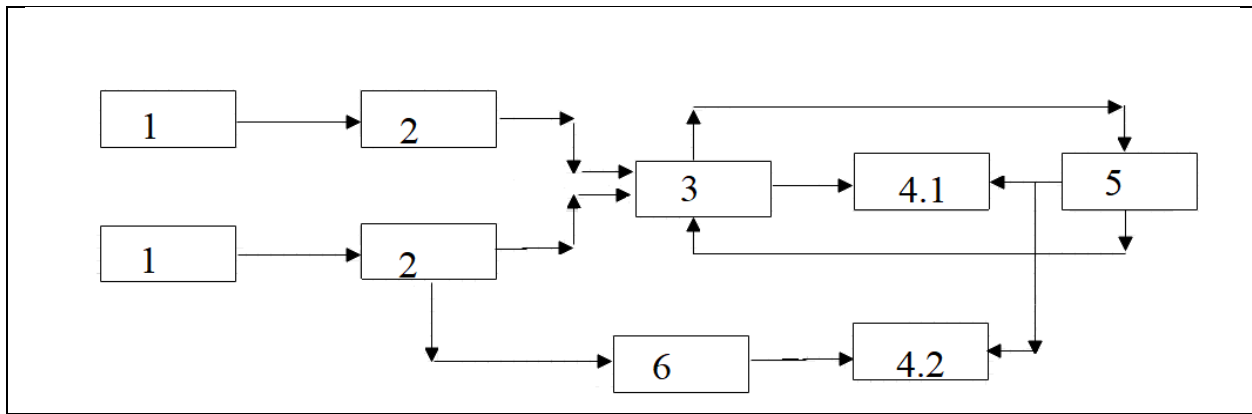


Figure 1.1

In Figure 1.1.1, energy consumers based on the combined use of solar and wind energy; 1) separate operation of QTE; 1.1) parallel operation of QET; 1st QET source; 2nd consumer motor; 3-heat energy accumulator; 4.1 and 4.2 electricity consumers; 5th traditional source; 6-electric energy accumulator.

In the system based on the combination of solar and wind energy, electricity is produced in WE, delivered to consumers and accumulated. This type of WE provides part of the required energy, while the rest is filled by conventional energy sources (dashed line). The capacity of the accumulator is selected according to the condition of WE producing high-quality electric energy and starting the conventional energy source in the discharge mode.

In this way, solar and wind energy can be used according to a pre-coordinated scheme for effective energy supply to agricultural consumers, which differ in the mode of energy consumption. In such a case, the SOE can produce electricity for the general energy system together with traditional energy sources.

The use of solar and wind energy involves the selection of solar and wind devices with parameters that provide efficient energy to energy consumers.

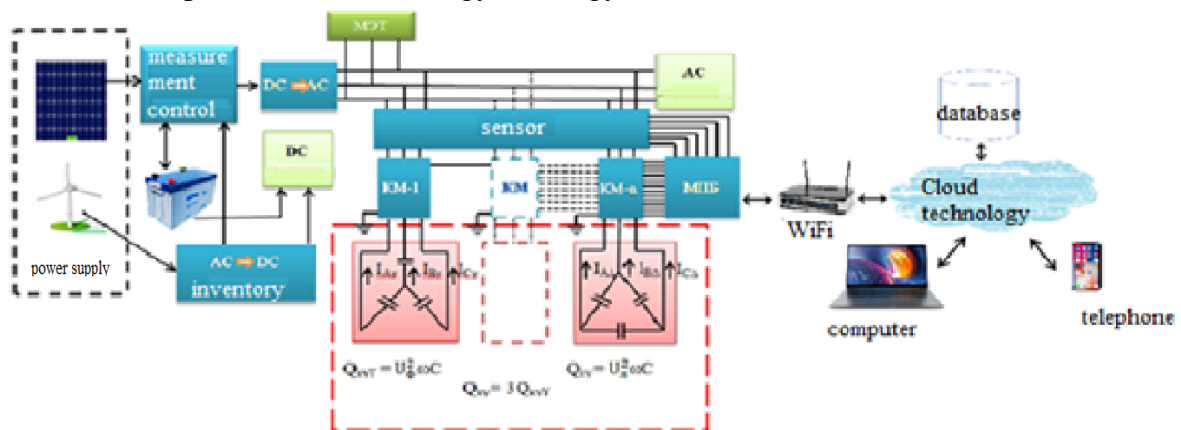


Figure 2. System of remote control of consumers of the source consuming from the hybrid power supply source.

For this, it is necessary to develop indicators that allow to determine the general characteristics of the SE system elements and evaluate the operating conditions. Indicators of use of SE. In order to determine the effectiveness of the considered options, it is necessary to know the condition of energy supply from SEM according to the daily indicator. The power supply option provides for a power device with specific parameters. To evaluate the conditions of energy supply during the day, we use the indicator called energy supply coefficient from SE:

$$K_{ob.i} = \frac{Q_{nol.sut.i}}{Q_{n.sut.i}(Q_{ak.sut.i})} \leq 1$$

Here $Q_{nol.sut.i}$ - the energy developed during the day in QEU or SHEU devices.

The useful energy developed in QEUs or SHEUs corresponds to the required energy provided. Useful energy is defined as follows.

$$Q_{not} = \begin{cases} Q_{a.ud}A \text{ yoki } Q_n > Q_n \\ Q_{u.yoki} Q_n \leq Q_b \end{cases} Q_b = Q_{a.ud}A$$

Exceeding the energy production needs leads to the release of energy into the environment. and causes it to be released into the environment. Energy supply conditions for the parameters of solar and wind energy devices:

helioenergetic device - solar collector (JV of GEQ) wind blade of wind energy device (ShEQ of ShP). In this case, the power that can be developed is linearly related to the surface area of the JV or ShP. But the main thing depends on the compatibility of GEQ and SHEQ with the generated energy and its need, and whether excess energy is not produced, which in itself leads to useless waste to the external environment. Therefore, the usefulness or usability of the GEQ or ShEQ with the proposed JV or ShP surface area

is evaluated. GEQ or ShEQ utilization coefficient is used to evaluate the utilization conditions of the installed area of solar collectors (SQ) or wind collectors (ShK).

$$K_{u.i} = Q_{n.i}/Q_{nol.i} \leq 1$$

The useful energy used is according to the above condition. When the generated energy is less than the required one, the installed surface areas of the JV or SHPs and the energy generated with their help are fully used, and the coefficient $K_n=1$. Otherwise, the energy device will not be fully used and energy will be wasted on the environment. The proposed criterion allows to evaluate the condition of daily energy supply in different months of the calculation period, as well as allows to evaluate the condition of use of one or another capacity of the SC or ShP. Logically, an increase in the energy supply coefficient will lead to a decrease in the installed power utilization coefficient of SK or WP.

When the values of the proposed indicators are known, it is possible to determine the useful energy developed in one day of a month.

$$Q_{nol.i} = Q_{n.i}K_{ob.i} = Q_{b.i}K_{u.i}$$

in this case

$$K_{ob.i} = \frac{Q_{b.i}}{Q_{u.i}}K_{u.i} = K_{u.i}Q_{b.ud.i}/Q_{n.i}A_{(ok)i}$$

Or

$$K_{u.i} = \frac{Q_{n.i}}{Q_{a.i}}K_{ob.i} = K_{ob.i}Q_{n.i}/Q_{a.y.d.i}A_{ck.(bk)i}$$

Due to the fact that the operation of technological processes and the modes of delivery of renewable energy are not related to each other, the energy produced during the year is not constant, and it is difficult to determine the law of any of its changes or the supply and consumption of energy.

The average value of the supply factor (K_{ob}) can be used to assess the condition of energy supply during the accounting period. But this indicator will not be an objective indicator, as it has a random character during the month or year. Thus, energy supply based on the use of QTE depends on the condition of energy supply to consumers. However, the energy supply coefficient

determined by the daily indicator of produced and consumed energy does not fully reflect the conditions of long-term energy supply.

We believe that an integral indicator should be entered for the accounting period. This indicator should represent the share of energy demand in the calculation period (season, year, month) filled in the SE calculation. If we emphasize that renewable energy has a random nature, it means that the possibility of replacing the energy supply to the consumer and traditional energy resources is also random and should be taken into account.

In conclusion, we can see the system and model of asynchronous motors, which are consumers of renewable energy sources, ecologically clean, without consuming any fuel, a continuous and economical source of energy for modern electricity consumers. contributes the same.

REFERENCES

1. Siddiqov I. X., Boyxonov Z. U., Karimjonov D. D. Elements And Devices For Monitoring And Control of Energy Efficiency. The American Journal of Engineering and Technology (ISSN – 2689-0984) Published: September 29, 2020 | PaGES: 136-148.
2. Siddiqov I. X., Boyxonov Z. U, Maxsudov M. T., Uzoqov. R. Features productions reactive power on systems electrical supply with renewable sources energies. Academicia: an international multidisciplinary research journal vol. 10, issue 6, June 2020 PaGES: 292-29
3. Maxsudov M. T., Boyxonov Z. U. Issledovanie elektromagnitnykh preobrazovateley toka v napryazhenie // Byulleten nauki i praktiki. 2018. T. 4. №3. S. 150-154. Rejim dostupa: <http://www.bulletennauki.com/mahsudov> (data obrasheniya 15.03.2018)
4. Egamov, D. A. Effektivnost primeneniya «perenosnogo AVR-0,4 kV» dlya obespecheniya bespereboynogo elektrosnabjeniya potrebiteley / D. A. Egamov, R. Uzakov, Z. U. Boixonov // Issledovaniya i razrabotki v oblasti mashinostroeniya, energetiki i upravleniya : materialy XIX Mejdunar. nauch.-texn. konf. studentov, aspirantov i molodyx uchenykh, Gomel, 25–26 apr. 2019 g. / M-vo obrazovaniya Resp. Belarus, Gomel. gos. texn. un-t im. P. O. Suxogo ; pod общ. red. A. A. Boyko. – Gomel : GGTU im. P. O. Suxogo, 2019. – S. 250-253.
5. Egamov D. A., Uzakov R., Boyxonov Z. U Sposoby obespecheniya bespereboynogo elektrosnabjeniya potrebiteley, imeyushix odnu sistemu shin 6-10 kV i dva nezavisimyx istochnika pitaniya 6-10 kV // Byulleten nauki i praktiki. 2018. T. 4. №3. S. 155-159. Rejim dostupa: <http://www.bulletennauki.com/egamov-uzakov> (data obrasheniya 15.03.2018).
6. Siddikov I. X., Maxsudov M. T., Boixanov Z. U. ugli, Sxema zamesheniya i analiz raboty asinxronnogo dvigatelya pri potreblenii reaktivnoy moshnosti. Glavnyy energetik №7 2021. 2021;7.
7. Maxsudov M.T., Anarbaev M.A., Siddikov I.X. Elektromagnitnye preobrazovateli toka dlya upravleniya istochnikami reaktivnoy moshnosti // Universum: Texnicheskie nauki : elektron. nauchn. jurn. 2019. № 3(60). URL: <http://7universum.com/ru/tech/archive/item/7095>
8. I.Kh. Siddikov, A.B.Abubakirov, A.A. Yuldashev, G.Z. Babaxova, I.M. Xonturaev, N.N. Mirzoev. «Methodology of calculation of techno-economic indices of application of sources of reactive power». European science review, Scientific journal. No 1–2. Austria, Vienna. 2018. 248-251 p.
9. Siddikov I. X., Anarbaev M. A., Maxsudov M. T. Preobrazovateli signala velichiny toka dlya sistem upravleniya istochnikami reaktivnoy moshnosti // Injenerno- stroitelnyy vestnik

- Prikaspiya : nauchno-texnicheskiy jurnal / Astraxanskiy gosudarstvennyy arkhitekturo-stroitelnyy universitet. Astraxan : GAOU AO VO «AGASU», 2018. № 1 (23). S. 53–56.
10. Siddikov I. Kh., Khakimov M. Kh., Anarbaev M., Bedritskiy I. M. Research of the electromagnetic transducers of the primary current to secondary voltage // Science and Education. Materials of the II International Research and practice conference. Vol. I, Publishing office of «Vela Verlag Waldkraiburg», Munich. Germany. December. 18–19. 2012. P. 222–225.
 11. Rustam Baratov, Nurali Pirmatov, Abdullo Panoev, Yakubjon Chulliyev, Sodiq Ruziyev and Almardon Mustafuqulov Achievement of electric energy savings through controlling frequency convertor in the operation process of asynchronous motors in textile enterprises. m IP address 213.230.96.54 on 28/03/2023
 12. Experimental research of magnetic circuits of current converters taking into account the nonlinearity of magnetic characteristics. A M Safarov, Kh A Sattarov, A.M. Mustafuqulov and Yu. Yu. Shoyimov. 2022 J. Phys.: Conf. Ser. 2176 012006.